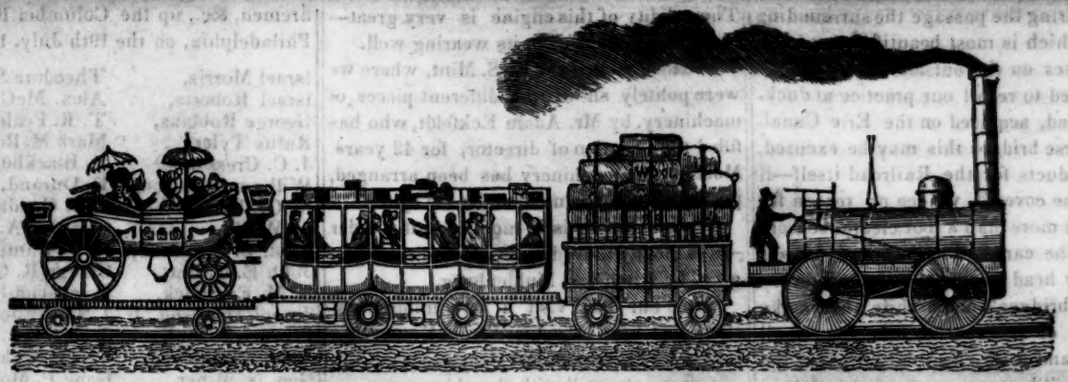

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 30, 1836.

Desirous of extending useful information and of awakening attention to obects of such great importance as those treated of in this No., we have issued a far larger number of copies than usual, for the purpose of gratuitous distribution. It will be found that we have devoted this No. entirely to the subject of Locomotive Engines.

We are gratified to perceive that the citizens of Owego are moving for the purpose of opening a communication between the Canals and Railroads of New-York and Pennsylvania. No State pride or selfishness should prevent a free intercourse—but trade be unrestricted.

"Public Meeting.—The citizens of Owego and its vicinity, are respectfully invited to attend a meeting, to be held this evening, (Wednesday) at Mr. Goodman's Long room, for the purpose of taking into consideration the best means of connecting the public improvements of the States of New-York and Pennsylvania, by a Canal or other water communication."

Wednesday, June 29, 1836.

EXCURSION TO PHILADELPHIA, AND REMARKABLE PERFORMANCE OF THE LOCOMOTIVE "GEORGE WASHINGTON."

In pursuance of our request, Mr. Norris made arrangements with the Commissioners of the Columbia Railroad, for the use of his locomotive.

Tuesday, July the 19th, was the day appointed for the trial.

We left here on Monday afternoon, at 4 o'clock, accompanied by Mr. George N. Miner of this city, Mr. Theo. Schwartz of Paris, and Messrs. Elliot and Beats, of Alabama. Mr. S., who was to sail for Europe the next day, gladly made the trip, with a view to carry home his own testimony as an eye witness.

Our journey over the Camden, and Amboy, and Trenton and Philadelphia Railroads, was highly interesting, and the conversation of that evening will long be remembered with pleasure. We arrived at Philadelphia about midnight and fter sundry mistakes and mischances, succeeded in obtaining some repose.

On Tuesday morning, two cars drawn by horses, set out with a party of upwards of forty. We arrived at the foot of the inclined plane before 6 o'clock, while the rails were yet quite wet with dew.

On our arrival, it was found that owing to accident or design, while the fire was burning, the water had been blown out of the boiler so as to endanger the tubes. The result was a leakage of some consequence during the day.

The engine started at the foot of the plane and on the plane. After proceeding a few feet, the wheels were found to slip, and the engine returned. It was said that the rails were found to have been *oiled* at this place, a small quantity of sand was strown over the spot, and the engine again proceeded. She regularly and steadily gained speed as she advanced to the very top, passing over the plane in 2 min. 24 sec. The enthusiasm of feeling manifested cannot be described, so complete a triumph had never been obtained,—the doubts that had been entertained by some, and the fears of others, were dispelled in an instant, the eager look that settled upon every ones face, gave way to that of confident success, while all present expressed their gratification in loud and and repeated cheers.

The length of the plain is 2800 feet.

The grade 369 feet to the mile, or 1 foot rise in 14.3, which is a much steeper grade than the planes on the Mohawk and Hudson Railroad, those being 1 in 18.

Making an ascent of 196 feet in 2800 feet.

Weight of engine with water 14.930 lbs.

Load drawn up the plane, including weight of tender with water and coal, two passenger cars and 53 passengers, 31.270.

Pressure in the boiler, less than 80 lbs. to the square inch.

Time of running 2 min. and 24 sec.

It is to be remembered that the rail were wet with dew.

As to the oil, it was afterwards mentioned that bets were made with the workmen to a considerable amount and those having been lost by the successful performance of the engine on a former day, were now quadrupled, and to save themselves it is not unlikely that this means was provided to accelerate the descent rather than the ascent of the engine.

At the conclusion we shall give the dimensions of this engine.

The party again embarked after examining the workshops, and proceeded to Paoli to breakfast, and thence to Lancaster, the engine conveying in at the same time a number of freight cars.

The unfortunate location of this road is very evident, frequent and short curves are introduced so uniformly, that it would be supposed that such a location was to be prefered to a direct one. Having a desire to

witness during the passage the surrounding country, which is most beautiful—we seated ourselves on the outside—but alas, we were obliged to recall our practice at ducking the head, acquired on the Erie Canal. In transverse bridges this may be excused, but in viaducts for the Railroad itself—if this must be covered, we see no reason for leaving not more than a foot clearance from the top of the cars. The locomotive bows its chimney head most respectfully to every one of the bridges—meanwhile the smoke unstrained of its sparks, fills the small space left, and most effectually dredges the passenger. The practice of using but three rails for two tracks is most villanous, especially as the bridges are covered.

We arrived safely at Lancaster and partook of an excellent dinner. A number of toasts were given, and conversation turned generally to the subject of internal improvement. Mr. Roberts, engineer of the Harrisburgh road, and Mr. A. R. Campbell, engineer of the Morristown, and of the West-Philadelphia Railroad, were present; a number of the company were citizens of Philadelphia, and we much regretted on looking over the names to find that Mr. Franklin Peale, and Isaiah Lukers, had been among those who had started with us, and whose personal acquaintance we had not the pleasure of making. We have long known these gentlemen as laborers in the scientific world, and would have had much pleasure in seeing them face to face.

After dinner, the company were presented to Governor Ritner, who was then in town. He afterwards accompanied the party some few miles from Lancaster and back again, when he left us, much gratified, with his rapid journey.

We returned in a large 8 wheel car, a form that we much admired.

The whole weight attached to the engine, (tender &c. included,) must have been over 14 tons, if not 15. The time of running, (exclusive of stoppage,) from Lancaster to the head of the Schuylkill inclined plane, was 3 h. 11 min., being a distance of nearly 67 miles. This, it is to be remembered, was over a road having curvatures of less than 600 feet, radius up ascents, of sometimes, 45 feet per mile. On level and straight portions of the road, a velocity of 47 miles, was attained.

As the trip had already been protracted, this engine was obliged to leave at the head of the plane, on her return to Lancaster the same evening and we descended by the rope.

The bridge at this point, over the Schuylkill, is a very fine one, the masonry being of a very substantial character.

We returned to our quarters, in good season, and highly delighted with our trip.

On the next morning we had the satisfaction of examining an engine now building for H. R. Campbell, under his own direction, and of which, a more extended description, with calculations, is given in this No. The solidity of this engine is very great—there is no doubt as to its wearing well.

We also visited the U. S. Mint, where we were politely shown the different pieces of machinery, by Mr. Adam Eckfeldt, who has filled the situation of director, for 42 years. Most of the machinery has been arranged, perfected and executed, under his eye.

The machinery is in most beautiful order—it is mostly moved by a very fine steam engine, by Rush and Muhlenburg.

Since our last visit a new milling machine has been introduced from France, we believe. The action is extremely beautiful, and contrasts well with the old process.

On Wednesday evening, we returned to this city—having, during our absence of two days and one evening, travelled over 300 miles, besides attending to much business, and having as much pleasure as is possible to crowd into so small a space of time.

The following are the dimensions of the "George Washington" engine, of Mr. William Norris:

Diameter of cylinders	10¼ inches.
Length of stroke	17⅝ "
Number of tubes	78
Outside diameter	2 "
Length	7 feet.
Diameter of driving wheels	4 "
" " Truck "	30 inches.

The engine is six wheeled, having two driving wheels.

Whole weight of engine	14,930 lbs.
Actual weight on driving wheels	8,700 "

It must be remembered, that there is no contrivance as in some engines, for increasing the adhesion, by throwing the weight of the tender upon the engines—the axle being in front of the fire box, preventing any such arrangement.

This engine, we are now informed, is making the regular trips, though a full load has not yet been obtained, on account of the scarcity of cars.

The greatest load, as yet, drawn by it over the road, was 119 tons, gross weight, in 22 cars. The Engineer confidently expects, to draw 150 tons, at 12 or 15 miles per hour. She now usually works with 70 lbs. pressure of steam. Mr. Norris considers that these fine effects are owing to an improvement in the adjustment of the valves—which he has attained, after a long series of experiments.

We wish him, and all others, engaged in the same cause—all possible success in accomplishing their object, and obtaining the proper reward for it.

The following is a list of the names of the gentlemen who were of the party:

We the subscribers were present and witnessed the experiment and complete success of the "George Washington," in ascending the inclined plane, with a train of cars containing fifty-four persons, besides engineers, firemen, &c., up the Columbia Railroad, at Philadelphia, on the 19th July, 1836.

Israel Morris,	Theodore Schwartz,
Israel Roberts,	Alex. McClure,
George Robbins,	T. R. Peale,
Rufus Tyler,	Mark M. Reeve, M. D.
J. C. Cresson,	F. Blackburne,
William Morrison,	E. Durand,
S. Griffits Fisher,	P. B. Goddard, M. D.
A. W. Thompson,	Octavius A. Norris,
Robt. B. Davidson,	H. R. Campbell,
John E. Garrett,	George R. Oat,
A. M. Eastwick,	Townsend Smith,
Joseph Harrison, Jr.	J. Sidney Jones,
Frederick Gaul,	Joseph Oat,
Alex. Krumbhaar,	Smith Jenkins,
Geo. N. Miner,	Isaac P. Morris,
Franklin Peale,	Frederick Vogel,
R. M. Patterson,	Mahlon Ortlip,
William S. Otis,	James Poultney.
D. K. Minor,	Daniel Smith,
George C. Schaeffer,	Thos. Moore,
T. E. Gubert,	Walter Sims,
	Nashville, Tenn.

We are gratified to perceive, as we do by the following circular, that the people in the town of Pawlings, Dutchess county, are moving in relation to the rrilroad from this city to Albany. We hope their example will be followed by every town on the line of the road, when it will in truth, become the road of the people.

Sir:—At a meeting of the inhabitants of Pawlings, convened at the house of Gideon Slocum & Sons, on the 9th of July, 1836, to take into consideration the propriety of aiding and assisting in the construction of the New-York and Albany railroad; the undersigned were appointed a committee to call on the farmers and others, inhabitants of the town, to ascertain what amount of stock would be subscribed, in said town.—In pursuance of such appointment, the committee have seen about fifty inhabitants and have the assurance that *fifty thousand dollars* will be taken in this town when the books are opened, which will be sufficient to defray the expense of the road through the town, a distance of about six miles.

If you should see the propriety of pursuing similar or such other measures as you may suggest for the promotion of this important work, it is believed our united efforts will be crowned with success.

GEORGE W. SLOCUM,
BENJAMIN BURR,
SAMUEL ALLEN,
JONATHAN A. TABER,
JONATHAN AKIN.

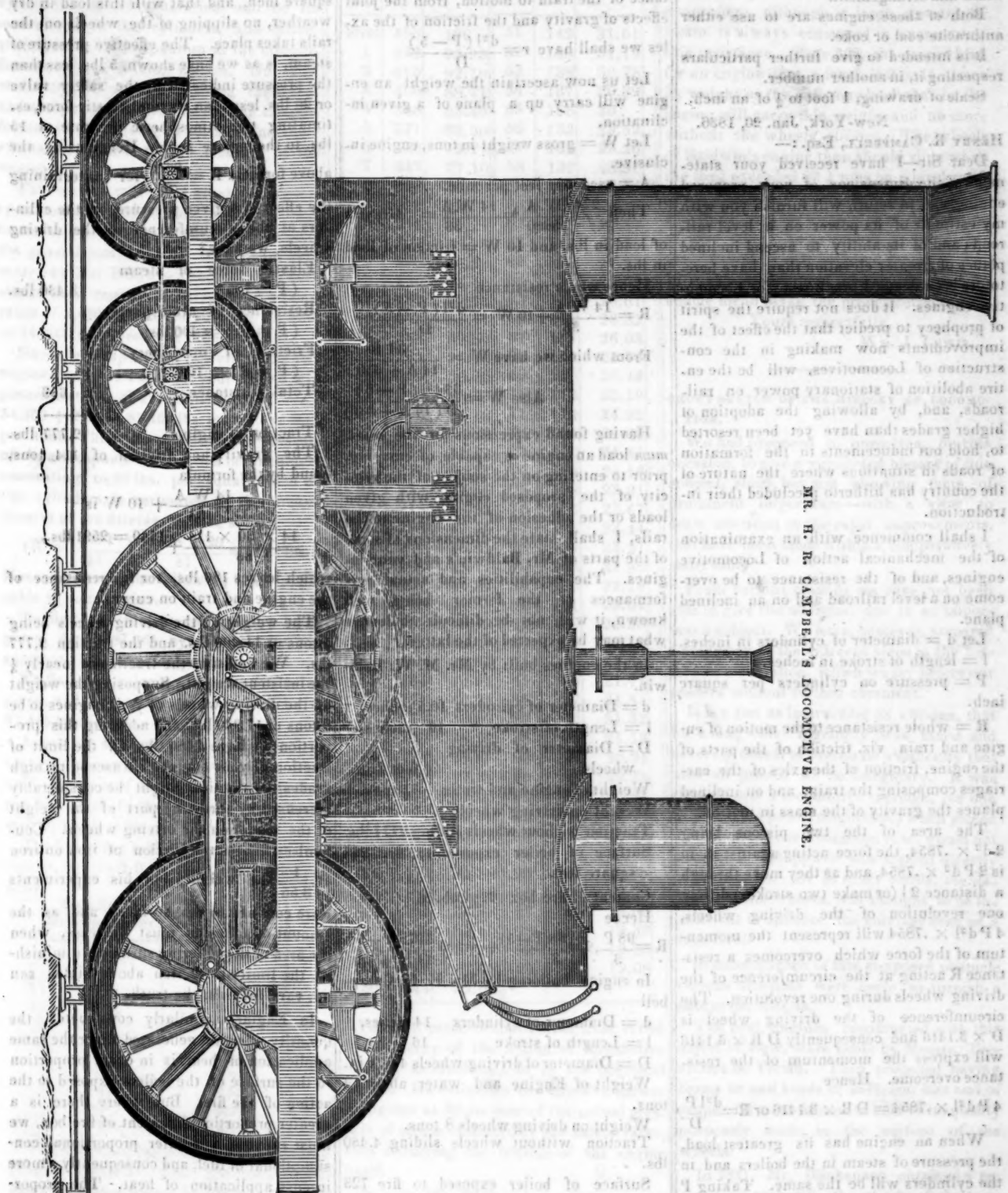
Pawlings, July 16, 1836.

The following letter, addressed to Mr. H. R. Campbell, of Philadelphia, is from Mr. Lewis, C. E., of the Brooklyn and Jamaica railroad. These calculations were made before the appearance of the work of the Chev. de Pambour—and we understand that the results given, very nearly agree with those obtained in that work.

The engine referred to in this letter, is to have 8 wheels—weight, 12 tons. It is the one referred to also, in our excursion to Philadelphia as having been seen by us.

The weight of the one of which the cut is given, is of the first class—weight, about 14 tons, having 8 wheels.

This cut represents a Locomotive engine,



MR. H. R. CAMPBELL'S LOCOMOTIVE ENGINE.

of the first class, weighing 14 tons, having 8 wheels (4 driving wheels). This engine will be able to draw as heavy loads as any engine calculated for rails of the present width and arrangement.

Both of these engines are to use either anthracite coal or coke.

It is intended to give further particulars respecting it, in another number.

Scale of drawing, 1 foot to ¼ of an inch.

New-York, Jan. 20, 1836.

HENRY R. CAMPBELL, Esq.:—

Dear Sir—I have received your statement of the dimensions of your proposed engine, and in return will furnish you with my estimate of its power on a level railroad; and of its ability to ascend inclined planes of greater elevation than have heretofore been deemed practicable for Locomotive engines. It does not require the spirit of prophecy to predict that the effect of the improvements now making in the construction of Locomotives, will be the entire abolition of stationary power on railroads, and, by allowing the adoption of higher grades than have yet been resorted to, hold out inducements to the formation of roads in situations where the nature of the country has hitherto precluded their introduction.

I shall commence with an examination of the mechanical action of Locomotive engines, and of the resistance to be overcome on a level railroad and on an inclined plane.

Let d = diameter of cylinders in inches.

l = length of stroke in inches.

P = pressure on cylinders per square inch.

R = whole resistance to the motion of engine and train, viz. friction of the parts of the engine, friction of the axles of the carriages composing the train, and on inclined planes the gravity of the mass in motion.

The area of the two pistons being $2\,d^2 \times .7854$, the force acting against them is $2\,P\,d^2 \times .7854$, and as they move through a distance 2 l (or make two strokes) during one revolution of the driving wheels, $4\,P\,d^2 l \times .7854$ will represent the momentum of the force which overcomes a resistance R acting at the circumference of the driving wheels during one revolution. The circumference of the driving wheel is $D \times 3.1416$ and consequently $D\,R \times 3.1416$ will express the momentum of the resistance overcome. Hence

$$4\,P\,d^2 l \times .7854 = D\,R \times 3.1416 \text{ or } R = \frac{d^2 l\,P}{D}.$$

When an engine has its greatest load, the pressure of steam in the boilers and in the cylinders will be the same. Taking P for the pressure on the safety valve the above equation will determine the maximum resistance an engine will overcome.—That portion of the resistance arising from the friction of the engine depends much upon the excellence of its construction, but may be estimated at 5 lbs. per square inch of the area of the piston, in addition to the usual allowance for the friction of the axles in railroad carriages, viz. 10 lbs. per ton.—Putting r then to express simply the resistance of the train to motion, from the joint effects of gravity and the friction of the axles we shall have $r = \frac{d^2 l\,(P-5)}{D}$

Let us now ascertain the weight an engine will carry up a plane of a given inclination.

Let W = gross weight in tons, engine inclusive.

A = ascent in feet per mile.

Then $\frac{2240\,W\,A}{5280} = \frac{14\,W\,A}{33}$ = Gravity of load in lbs. and 10 W = friction of load in lbs.

Hence whole resistance

$$R = \frac{14\,W\,A}{33} + 10\,W = \frac{d^2 l\,(P-5)}{D}$$

From which we have $W = \frac{33\,R}{14\,A + 330}$

Also $W = \frac{33\,d^2 l\,(P-5)}{D\,(14\,A + 330)}$

Having found expressions for the *maximum* load an engine is capable of carrying, prior to entering on the subject of the velocity of the proposed engine with given loads or the adhesion of the engine to the rails, I shall state the dimensions of some of the parts of Mr. Baldwin's and your engines. The capabilities and actual performances of the former being well known, it will not be difficult to deduce what may be expected of the latter.

In the engines built by Mr. M. W. Baldwin.

d = Diameter of cylinders	10.5 inches.
l = Length of stroke	16 inches.
D = Diameter of driving wheels	4 feet 6 in.
Weight of engine and water	7½ tons.
Weight on driving wheels	5 "
Traction without wheels sliding	2777 lbs.
Surface of boiler exposed to fire	298 square feet.
Content of fire box	22½ cub. ft.

Hence

$$R = \frac{98\,P}{3}, r = \frac{98(P-5)}{3} + w = \frac{1078(P-5)}{14\,H + 330}.$$

In engine building by Mr. H. R. Campbell

d = Diameter of cylinders	14 inches.
l = Length of stroke	16 "
D = Diameter of driving wheels	4 ft. 6 in.

Weight of Engine and water about 12 tons.

Weight on driving wheels 8 tons.

Traction without wheels sliding 4.480 lbs.

Surface of boiler exposed to fire 723 square feet.

Content of fire box 53 cubic feet.

Hence

$$R = \frac{1568\,P}{27}, r = \frac{1568}{27}(P-5) \& W = \frac{8624(P-5)}{63A + 1485}$$

It is known that M. W. Baldwin's engines can convey a gross weight (Engine and Tender included) of 114 tons up grades of 30 feet per mile at a velocity of 10 miles per hour, maintaining a constant pressure on the safety valve of ninety pounds to the square inch, and that with this load in dry weather, no slipping of the wheels on the rails takes place. The effective pressure of steam, is as we have shown, 5 lbs. less than the pressure indicated by the safety valve or 20 lbs. less than its total elastic force, estimating the atmospheric pressure at 15 lbs. to the square inch. Hence using the above formula $R = \frac{98\,P}{3}$ for ascertaining the effect of a given pressure on the cylinders at the circumference of the driving wheels, we have:

Elastic force of steam (P = 105)	3,430 lbs.
Resistance of atmosphere (P = 15) = 490 lbs.	
Friction of machinery (P = 5) = 163	
Total resistance	653
Traction of engine	2,777 lbs.

The gravity and friction of 114 tons, found by the formula

$$r = \frac{14\,W\,A}{33} + 10\,W \text{ is}$$

$$\frac{14 \times 30 \times 114}{33} + 1140 = 2591 \text{ lbs.},$$

which leaves 186 lbs. for the resistance of the engine and train on curves.

The weight on the driving wheels being 5 tons or 11,200 lbs. and the traction 2,777 lbs. We find that the traction is nearly ¼ the insistent weight. Supposing the weight on the driving wheels of your engines to be 8 tons or 17 920 lbs. and adopting this proportion we have 4.480 lbs. for the limit of traction of your engine. In ascending high grades the traction might be considerably increased by throwing part of the weight of the tender on the driving wheels. Coulomb estimates the friction of iron on iron at $\frac{1}{3.55}$ the weight; but his experiments were confined to flat surfaces, and as the amount of adhesion must decrease, when the area of the adhering surface is diminished, the limit of traction above stated can not vary far from the truth.

In Engines similarly constructed, the quantity of steam generated under the same application of heat, is in exact proportion to the surface of the boilers exposed to the action of the fire. But where there is a greater proportional content of fire box, we must suppose a greater proportional consumptional of fuel, and consequently a more intense application of heat. The proportion of exposed surface in the two engines is 1 to 2.43, but the proportion of the contents of the fire boxes is 1 to 2.80. Adding to the first ratio ⅓ of the differsnce for the more intense application of heat. I shall estimate the evaporating power of your engine at 2.55 times that of those built by M.

W. Baldwin. As the elastic face of the steam varies in the direct ratio of its density, the momentum of the steam generated by the boiler, or its elastic force multiplied by its velocity of generation will be its momentum in the cylinders, and consequently, also its momentum at the circumference of the driving wheels. No error will therefore arise in refering the forces and resistances immediately to the circumference to the driving wheels or find their effects as applied to the traction of the engine.

This method will avoid much unnecessary calculation, and enable us at a glance, to see how every item of the account affects the general computation. The steam generated by Mr. Baldwin's engines, has been shown to be capable of overcoming a resistance of 3,430 lbs. moved 10 miles an hour or 34,300 lbs. moved one mile per hour.

Now the evaporating powers of the two engines being as 1 to 2.55, your engine will generate steam of an electic force of $34.300 + 2.55 = 87\ 465$ lbs. moved one mile per hour. The resistance from the pressure of the atmosphere and friction of machinery amounting to 20 lbs. per square inch on the cylinders, is estimated at the circumference of the driving wheels, since

$$\left(R = \frac{1568\ P}{27}.\right) \quad \frac{1568 \times 20}{27} = 1161 \text{ lbs.}$$

Hence we have the following rules applicable to your engine.

To find the traction, the velocity being given, divide 87.465 by the velocity and subtract 1161 from the quotient.

To find the velocity, the traction being given, add 1161 to the traction, and divide 87.465 by the sum.

Assuming 450 tons as the greatest load (gross) the engine can convey on a level road (for want of adhesion) and estimating the friction at 10 lbs. per ton, the velocity will be $15\frac{45}{100}$ miles per heur.

The following table will exhibit the traction at velocities from $15\frac{45}{100}$ to 25 miles per hour.

Velocity in Miles per hour.	Traction in pounds.
$15\frac{45}{100}$	4.500
16	4.305
17	3.984
18	3.698
19	3.443
20	3.212
21	3.004
22	2.814
23	2.642
24	2.483
25	2.338

The following table shows the gross load (engine inclusive) your Locomotive will carry up grades from 1 to 100 feet per mile at a velocity of $15\frac{45}{100}$ miles per hour. A column is added which shows what weight on different ascents is equal to a 100 tons on a level road, and furnishes a very convenient table of multiples for finding what load on a graded road is equivalent to a given load on a level.

Rise per mile in feet.	Load in tons.	Load = 100 tons on a level.	Rise per mile in feet.	Load in tons.	Loads = 100 tons on a level.
level	450	100	51	142	31.61
1	432	95.93	52	140	31.19
2	415	92.18	53	138	30.78
3	400	88.71	54	137	30.39
4	385	85.49	55	135	30.
5	371	82.50	56	133	29.62
6	359	79.71	57	132	29.26
7	347	77.10	58	130	28.90
8	336	74.66	59	128	28.55
9	326	72.37	60	127	28.21
10	316	70.21	61	125	27.87
11	307	68.18	62	124	27.55
12	298	66.26	63	122	27.23
13	290	64.45	64	121	26.92
14	282	62.74	65	120	26.61
15	275	61.11	66	118	26.32
16	268	59.57	67	117	26.03
17	261	58.10	68	116	25.74
18	255	56.70	69	115	25.46
19	249	55.37	70	113	25.19
20	243	54.10	71	112	24.92
21	238	52.89	72	111	24.66
22	233	51.72	73	110	24.41
23	228	50.61	74	109	24.16
24	223	49.55	75	108	23.91
25	218	48.53	76	106	23.67
26	214	47.55	77	105	23.44
27	210	46.61	78	104	23.21
28	206	45.71	79	103	22.98
29	202	44.84	80	102	22.76
30	198	44.	81	101	22.54
31	194	43.19	82	100	22.33
32	191	42.42	83	99	22.12
33	188	41.67	84	98	21.91
34	184	40.94	85	98	21.71
35	181	40.24	86	97	21.51
36	178	39.57	87	96	21.32
37	175	38.92	88	95	21.13
38	172	38.28	89	94	20.94
39	170	37.67	90	93	20.75
40	167	37.08	91	93	20.57
41	164	36.50	92	92	20.40
42	162	35.95	93	91	20.22
43	159	35.41	94	90	20.05
44	157	34.88	95	89	19.88
55	155	34.38	96	89	19.71
46	152	33.88	97	88	19.55
47	150	33.40	98	87	19.39
48	148	32.97	99	87	19.23
49	146	32.48	100	86	19.08
50	144	32.04			

You will perceive that I differ from Wood in the theory of the action of locomotive engines, as much as I do in the practical results. He estimates the effective power of engines at 30 *per cent* of the actual pressure of steam indicated by the safety valve, after deducting the friction of the engine itself.

Now in Mr. Baldwin's engines twenty pounds at the safety valves gives a traction of 2.940 lbs. 30 per cent is 882 lbs.,, so that without taking into account the friction of the engine, we should have a force sufficient to move but 88 $\frac{2}{10}$ tons on a level road, or 38 $\frac{8}{10}$ tons up a grade at 30 feet per mile! *No percentage* can be assigned, for a certain resistance is opposed to the motion of machinery, which does not depend upon the pressure of steam. Not a word is said on the subject of the resistance of the atmosphere, although a large amount of steam is always consumed in overcoming this resistance. Page 368, the proper load for an engine upon a level, is 9 or 11 times its weight as the case may be, "that is, the engine will carry this weight and no more without the wheels sliding. The wheels of Baldwin's engine than should slide when the load exceeded 82 $\frac{1}{2}$ tons on a level road, or 36 $\frac{3}{10}$ tons on a grade of 30 feet per mile! I have adopted his statement of the friction of cars which he estimates at 10lbs. per ton. I think it will be found too great, but I have no accounts of any experiments to enable me to make the proper correction.

Yours respectfully,

Wm. J. Lewis.

SHORT SKETCH OF THE HISTORY OF LOCOMOTION.

We had proposed to ourselves, on this occasion, to give a connected history of this subject, short, but still showing facts of prominent importance—with a view to draw attention to the rapid improvements, that have been made within a comparatively short time.

From various reasons we have not been able to give the attention due to so important a subject. We have, however, prepared a summary of the different steps in the history of locomotion, which we lay before our readers without further comment.

It is a fact as instructing as curious, that for a long time, ingenuity was taxed and severely taxed, to overcome a difficulty that after all proved to be imaginary. It was thought that a locomotive carriage, (or one in which the power originated,) when placed upon iron rails or a common road, would not advance if the power was applied directly to the wheels. Or in other words, the *adhesion* of the wheels, was thought to be insufficient to advance the carriage *even on a dead level.*

In consequence of this supposed obstacle various attempts were made to furnish a *hold* to the wheels.

The first engines constructed with this object in view, were made by Messrs. Trevithick & Vivian. They proposed having *bosses or nail heads* of sufficient size and of proper form to furnish a hold to inequality purposely made, in the surface of the wheels.

In 1811, Mr. Blinkensop obtained a patent for a rack rail—the wheels of the locomotive being furnished with corresponding cogs.

In 1812, Mr. Chapman obtained a patent for advancing a locomotive by means of a chain extended over the whole line and fastened at the ends. This chain was passed once around a grooved wheel which was

moved by the engine, the resistance offered by the chain which could not itself advance, caused the engine to move.

In 1813, a contrivance, often mentioned as an instance of great ingenuity, was produced by Mr. Brunton. In this machine, an apparatus, similar in construction and motion, to the legs of an animal, was moved by the engine. In fact it was a locomotive walker, pushing along the engine, &c.

These contrivances are familiar to most persons, and therefore do not require a more extended notice in this article. They were entirely superseded in the year 1813, by a discovery of singular merit. In fact, Mr. Blackitt, (who had failed in the employment of some of the above named engines) *actually discovered that the adhesion of the rails and wheels was sufficient to propel, not only the engine, but a weight of some amount after it.* Though this may appear to us, a somewhat left-handed discovery, yet there is no doubt, but that to this gentleman belongs a vast deal of credit, for successfully establishing the fundamental principle of locomotion.

The first experiments on this subject were made upon the Wylam railroad, and the amount of adhesion ascertained by manual labor. The first engine said to have been used upon the road, had but one cylinder, and a fly wheel, to regulate the motion. As may be supposed, this was but a troublesome affair, moving steadily—by jerks. What a contrast with our complete machines of this day!

From this period, however, rapid advances were made, and the locomotive engine began to work its way into favor.

In 1814, Mr. Stephenson constructed an engine, with two cylinders, in which the cranks were placed at a right angle, the one to the other, so that both were not at a dead point, or in full power, at the same time. This was effected by an endless chain, having iron cogs on the axles—and maintained a more equal motion. The chain was finally abandoned, and simply a straight connecting rod substituted.

This engine was able to draw on an edge rail, ascending 1 in 450, 30 tons, exclusive of its own weight, four miles per hour.

Other improvements were afterwards made, and among them was the one dispensing with the use of cogs, in communicating power to the wheels.

The next important point in the history of locomotives, is connected with that of the Liverpool and Manchester railroad.

There was a division of feeling among the directors, some in favor of stationary engines, while others desired locomotives.

Messrs. Stephenson and Lock, and Messrs. Walker and Rastrick, were employed to collect information on the subject From the report, and information furnished, the directors were more at a loss than ever. Meanwhile thousands of projects were poured in upon them.

There was, however, some partiality shown to locomotives; and to settle the question, the directors offered £500 for the best locomotive engine, the trial to be before proper judges, and certain conditions to be fulfilled. Among them, we insert the 2nd article.

"The engine if it weighs six tons, must be capable of drawing after it, day by day, on a well constructed railway, on a level plane, a train of carriages of the gross weight of *twenty tons*, including the tender and water tank, at the rate of ten miles per hour, with a pressure of steam in the boiler not exceeding 50 lbs. on the square inch."

Let the reader recollect that this was in 1829—seven years ago!

The offer of this reward brought out several engines, of the result of the experiments, and their effect in determining the directors in favor of locomotive engines, our readers are well aware.

The most successful engine was the Rocket, of Mr. Stephenson; the distance was travelled at rates varying from 11½ to 29 miles per hour. The great merit of this engine was owing to tubes inserted in the boiler, as is now universally practised—this was the invention of Mr. Booth, Treasurer of the company.

Many engines were made for this road, several still retained by the company, after having been crowded out by more improved machines, before they had had time to wear out.

On the Sutton and Whiston inclined planes, rising 1 foot in 96, or 55 feet per mile, the use of stationary power was contemplated. We find, however, that in June, 1830, about the time of the public opening of the road, a weight of 33 tons, (including tender), was carried up the Whiston plane, by the Arrow, assisted by the Dart, at a speed of 17 miles per hour, decreasing to 4 miles per hour. The same engine, unassisted, drew six tons weight up the plane, at the rate of over 15 miles per hour!!—These were considered as fair experiments, and were published, in order to give an idea of the great power of the engines. In December, 1830, the Planet drew a gross weight of 80 tons up the Whiston plane, "*assisted by other engines,*" at the rate of 9 miles per hour!!

Let us leave the old world and turn to the new.

The merits of Locomotives had been for some time discussed in this country, but the data furnished by the English experiments, were adopted as English engines were used. Presently engines were made in this country, and then wonderful stories were first heard of engines doing more than they could do, *according to the English calculations.*

The Baltimore and Ohio Railroad Company, with a most praisworthy perseverance, brought forward one improvement after another, until some began to doubt the propriety of pushing the matter so far. It is true that, subject as we all are to error, too sanguine expectations have in many instances been entertained, but we have only to do with actual performances and such as have been repeated.

We have no means at hand for ascertaining the particulars of the ascent of plans for sometime back, and in truth, owing to the nature of the surface of our country, whenever great summits were to be overcome, inclined planes with stationary power were used, and ascents of 45 feet per mile were considered as inadmissable.

The Baltimore and Ohio Company, encouraged by their success, are altering their inclined planes by changing the route, and it is now their intention to cross the Alleghany mountains without using stationary power.

The location of the Erie road, on which it was very desirable to avoid the delay, expense and hazard of using stationary power, brought the merits of locomotive engines into more conspicuous notice than ever.

In the report of the Baltimore and Ohio Railroad Company, published Oct. 1834, it was stated that the "Arabian" had drawn "upwards of 112 tons on a level, at the rate of near twelve miles an hour, and the same weight up an ascent of 17 feet per mile, on a curve of 1000 feet radius, at the rate of 6½ miles an hour."

From the report of last October, we learn that in "December, 1834, the same engine passed over the plains at Parrs Ridge, ascending ⅔ of a mile at the average rate of 264 feet per mile, with two cars full of passengers, making with the tender 11 tons, exclusive of its own weight of 7½ tons."

Again, "on the 26 September last, a load amounting to 113 tons, was attached to the Washington, a new engine, on the plan of the Arabian, weighing 8 tons, with a view of making an experiment of the effective power of the Company's engines, on the branch road. With this great weight, the engine travelled to the city of Washington, at a rate, not less at any place, than ten miles an hour, preserving this, the least speed up ascents five and six miles in length, of twenty feet to the mile. The train was several times purposely stopped on the ascending grades, and when the steam was again applied, the engine would steadily regain its previous velocity, and maintain it with apparent ease. The same load was brought from Washington to Baltimore, at the same rate. The *average* speed was much greater, and upon the level parts of the road, seemed entirely at the discretion of the engineers. The same engine, on a level, exerting the same power, would have drawn 213 tons at the rate of ten miles per hour. During the whole time there was a superabundance of steam. Performances like this are, it is believed, unequalled in the history of Railroads."

This report was published last fall, and

these statements were considered, as "putting the best foot foremost." Indeed we have found many who considered that a proper allowance was to be made, in the statement of the facts—not to make the subsequent improvement appears to be too great, we will not take them at their word, but will allow the report to stand as it is.

In the report of H. R. Campbell, Engineer of the West Philadelphia Railroad, presented in October last, Mr. C. asserted that Baldwin's engines on theColumbia road drew "trains of 20 and 24 cars, containing each three tons of merchandize, up 45 feet grades, at 10 to 12 miles per hour; while engines of English construction, from the works of Robert Stephenson, Esq. the celebrated Engineer, carry up the same road only 14 cars, at the same rate of speed.—This great difference is produced by the superior arrangement, and mechanical application of power to Mr. Baldwin's engine, and not from any difference in the weight and adhesive power of the respective machines."

This statement so contradictory to the general opinion, has drawn out much discussion—and the report of Mr. Seymour of the Erie road, stating the facts as they are to be found on the different roads, were also, "thoroughly analysed."

It is not singular, that surprise should be excited—but that the facts are correctly stated, is certain.

Now, there is an engine on the Columbia road—the "George Washington," weighing only 7½ tons, that has drawn over 15 tons up a plain ascending 369 feet per mile, at the rate of 14 miles per hour.

This same engine, has drawn as much as 119 tons in 22 cars, over this road (which is a most severe one for such trials, having numerous and short curves) with great ease, she not yet having tried her utmost power.

We desire our readers to compare these rapid improvements, and to study carefully the results.

We have omitted many matters of interest in this sketch, it being merely intended to place before the view at once, the most important experiments in Locomotion.

NOTE.—We should have done injustice to that patriarch of internal improvements memory, Oliver Evans, had we omitted mentioning his attempts to establish steam carriages,and his predictionsalready verified which then brought upon him the suspicion of mental derangement. The particulars are well known to every one.

TO THE READERS OF THE JOURNAL, ENGINEERS, DIRECTORS OF RAILROAD AND CANAL COMPANIES, CONTRACTORS AND ALL OTHERS ENGAGED IN WORKS OF INTERNAL IMPROVEMENT.

We embrace the opportunity offered by the distribution of an extra number of copies of the present impression, to address our readers and others on a subject of importance to them and to us.

It has been our intention for sometime past to prepare our Journal for more extensive usefulness. These preparations have been gradual, and we hope certain because gradual. The circulation of the Journal being in places far distant and scattered over the union, its readers are enabled to obtain, whenever there may be,information respecting all matters of interest to them. It also furnishes the most ready means of communication between engineers and others interested in thecause of internal improvements.

Now what we desire, is to have from Presidents and Directors of Companies—copies of all their reports up to the present time (as nearly all those on hand were destroyed last winter by the great fire.)

From Engineers also, copies of such reports of their own and others as they may have at their disposal—and also short and condensed accounts of such Railroads or Canals as they have been or may be engaged upon—stating their length—grades—elevations at different points above high water or some other known level—and as much of the topography of the surrounding country as may be necessary to a correct understanding of the location—estimates of expense of grading, &c., and in particular, the size, weight, and figure of the rail, used with an account of the mode of structure. (It is the worh of but a few minutes to give from a model or the rail itself a figure of full size on a sheet of letter paper.) Also the total cost per mile, together with the number, size, different plans of bridges, with particulars as to the success of each.

Similar details are desired in regard to the construction of Canals, Tunnels and Hydraulic work of every description.

With this information we shall be enabled to lay before our readers a better practical body of engineering than any work in any language can afford. Our readers will be enabled to see and judge for themselves of the propriety of this or that mode of construction; in short, to have before them in their studies, information to be acquired at present only by a journey from one end to another of the Union, winding between hills up one side of a valley and down the other, making a journey nearly equivalent to one around the globe—including a trip to England, Scotland, Ireland, Wales, France and Germany. In short without the trouble of visiting every public work in the world—information respecting them all will be before our readers. We shall also be able to publish a revised and corrected Railroad map, bringing it down to the latest dates.

Our foreign correspondence and exchange will enable us to give the most recent intelligence from all parts of Europe.

We shall ever feel happy to visit our friends and examine personally their works; and some facts, such as the details of the experiment in this No. are only to be given satisfactorily by an eye witness.

All we ask is to give us free access to and over your different roads, and on every occasion of importance, and at stated intervals if possible, one or both of the proprietors of the Journal will be present and examine whatever there may be of general interest.

We ask this because the result will be of general benefit, and it will be much less difficult for two yearly free tickets to be spared to us from each road, than for us to spare the cost of travel yearly over each road in the Union. The Journal has been sustained so far under every disadvantage from a subscription list of zero, we call upon its friends and all concerned, to push its list, its usefulness and improvements generally, as far up towards infinity as they please.

We also desire to make our columns the medium of communication of such memoirs and other articles as our friends may favor us with—they are always open to free gentlemanly discussion, and from the undoubted talent engaged in this profession in our country, much valuable information may be elicited.

It is also our wish to advertise all lettings of public work, making our Journal the means of conveying intelligence between Contractors and Companies—and in this respect we enjoy a great advantage numbering both parties among our constant readers.

We have also made preparations to answer calls for instruments for engineers, of every discription, and made under our own supervision. We hope in a few months to be able to furnish complete outfits to Engineers—all the instruments being made by a maker of extensive practice, and information acquired from the best workmen in England and this country—and made as we have said under our own direction.

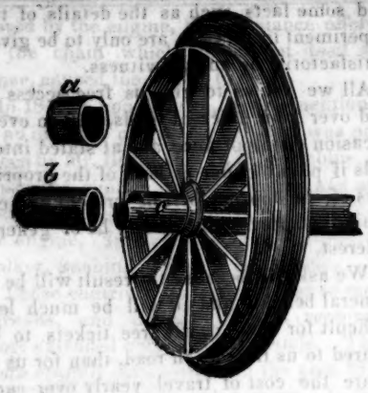
A properly prepared price current of Railroad,Canal—and the leading bank stocks, is intended to be inserted, as also a review or other notice of all new works relating in any manner to the profession.

We hope that we have convinced our readers by the exertions already made, and by what we have said, of our intention to increase as much as possible the utility and interest of the Journal as well as of their ability to assist us. We promise them not to be found wanting.

Those editors who may receive this number of the Journal, are requested to copy the above circular; and also to give us the benefit of the light of their countenance on the present, as on former occasions; and send us their paper in exchange hereafter.

RAILROAD AXLE JOURNALS.

The certain and unavoidable destruction of the JOURNALS of Railroad axles renders



it necessary, or at least highly important, that a cheaper and more expeditious mode of repairs should be devised than is now in common use. By the ordinary mode of repairing journals, whether by overlaying them, or by splitting and welding in a piece of iron at each end and then turning them down asin their first formation, the expense is, on an average, $4 for each journal,or $16 for *each car*—and this repair must be performed as often as once in four years—it being estimated that the machinery and carringes will require to be renewed every four years.

If this estimate be correct the annual expense will be $4000 a year on a thousand cars, for repairs of the *journals* of the axles alone; or $40,000 per year on a road which, like the Erie railroad, is estimated to require 10,000 cars, and this too in addition to the increased original outlay for cars, in consequence of the additional number required to take the place of those "in the Hospital," for repairs.

Several efforts have been made to reduce this item of expense, yet none, that we are aware of, has succeeded, unless the one referred to in the following account shall be found to succeed. It has been, and is now in use, and thus far to the entire satisfaction, as we are informed, of those who have witnessed the result of experiments with it on the Baltimore and Susquehannah railroad—and it will, we apprehend, soon be duly appreciated and introduced into general use on all railroads.

This mode of repairing the *journals* of axles, and indeed of all kinds of machinery, will be readily understood, by a reference to the accompanying drawing and description; and it will also be perceived that the repairs can be accomplished, where the axles are *made in the proper manner*, at an expense of a few shillings, certainly *not to exceed a dollar* for each journal, or *four* dollars for each car, and the delay of an hour. Indeed it may be done while the car is loaded, and even on the track, thereby avoiding the trouble of taking the disabled subject to the *Hospital*, which is not unfrequently at the distance of many miles from where the repair may be required.

It will be observed that this drawing represents one wheel with a part of an axle, shewing the journal prepared to receive the *thimble*, or *ferrule*, *a*. and, *b* representing the two ends of a cylinder, which is of iron, case hardened, or steel, ¼th of an inch in thickness, and made to fit accurately to the journals of the axle *c*, which should be of the best quality of iron. This thimble is kept from revolving on the journal, by the square, as shown in and on the outer end *a* and *c*; or it may be confined by a pin, as shown in *a, b, c.*

The expense of these thimbles, it will be perceived, cannot exceed 60 to 75 cents each; and the cost of labor in putting them on, a mere trifle, certainly not over 25 to 50 cents.

The *economy* in this item of repairs is a matter of no small consequence—as it will amount, on a *single car*, to at least $2,50 and probably *three* dollars a year, and on a *thousand* cars to $3000—and on the *New York and Erie* Railroad, to $30,000. Yet this is not perhaps its most important feature—its greatest value will be found in the *facility* with which the repair may be made, and the saving in the first cost, from the less number, of cars required.

The proprietor, Mr. D. C. Force resides at Baltimore, and is now prepared to sell rights to companies to use them, or to manufacture the thimble, as may be desired. Information may also be obtained and the mould examined at the office of this Journal.

SUSPENSION BRIDGE OVER THE NIAGARA.

Our readers must be aware that the crossing of this river at Lewiston, as usually effected by the ferry, is not always safe, and during much of the winter impassable.—The rapid increase of the various towns in the vicinity, the constant travel to the falls, and above all the construction of numerous public works, all having a direct bearing upon this point—have indicated the necessity of a bridge—and independent of considerations of economy, none other is here practicable than a suspension bridge.

The value of suspension bridges has been some time established and numerous works constructed on this principle fully sustain their reputation.

In England the far famed Menai bridge by Telford is the most splendid in the world, and of immense utility. The first bridge however, on this principle, was built of iron, over the Tees, at Durham, somewhere about the year 1752. It was intended only for foot passengers. The bridge over the Tweed, at Kelso, was finished in the year 1820. The length was 300, the width 18 feet. The Menai bridge was completed in 1825; its length is 560 feet and width 30 feet. Several other bridges of this description have been more recently erected in England,—and among others that at Dry burg Abbey is celebrated for its extreme beauty.

In France, this mode of construction has been generally established. There is one over the Seine, at Paris, one over the Charente, one over the Dordogne and one over the Rhone.

In Switzerland, the Fribourgh bridge has attracted much attention. It is thrown over the Sarine and its valley, and affords a safe and direct transit instead of the old circuitous and sometimes dangerous road.

The bridge at Geneva has several piers, and the suspension chains are below the road way.

In the United States many small suspension bridges have been constructed—among the largest are, two over the Monongahela, one over the Brandywine and another over the Merrimack, measuring 244 feet between the points of suspension.

It must be evident to the most careless observer that no situation is so advantageous for a suspension bridge, as a valley or river with high and precipitous banks.—This is precisely the situation most unfavorable to a common bridge, especially as the heighth above the water has no effect upon the cost or durability of suspension, while it vastly increases the one and hazards the other in the common form, so much so as in many cases to render it impracticable.

In the present instance, besides the depth and rapidity of the river and the heighth and sudden descent to the water from the banks, the accumulation of ice in winter is alone an obstacle of sufficient magnitude to prevent the construction of an ordinary pier bridge. From a diagram before us we perceive that the length of the bridge from bank to bank is to be 930 feet, the width of the surface of the water being 597 feet. The point selected for crossing is the most favorable that could be found on many accounts.

The estimates and surveys ,have been made by Francis Hall, Esq., C. E. Two different plans are proposed; one being estimated at $93,541, the other at $131,511.

The towers can be built on the bank requiring a less cost for masonry but a greater strength of chain and longer curve, while if they are built at or near the water's edge, their height will be much greater, whilef the length of the chain will be reduced from nearly 1000 to 600 feet. In either case the height of the roadway will be 125 feet from the surface of the water.

An idea of the strength of this sort of structure may be had from the estimate of the engineer. The heaviest load that can possibly be placed upon the bridge would be cattle covering its surface, and this load would be sustained at a pressure 358 tons short of that required to produce rupture, at the lowest calculation and after making proper deductions.

The chains are calculated to sustain a strain of over 1000 tons beside the bridge itself, and the suspending rods a weight of 6000 tons including their own weight.

The materials for this bridge can be obtained with ease. The best stone for the masonry can be found on the spot and lime also.

The revenue of this bridge estimated at the present rates will yield a handsome per centage on the capital, while there is no doubt but that the transit at either point will be more than doubled by this increased facility.

So fine a specimen of man's work beside the most wonderful piece of nature's handiwork could not fail to attract universal attention. We have only to recollect the important improvements in progress to be convinced of the absolute necessity of some such mode of communication. A glance at the map will suffice.

We understand that the subscription books are open at Lewiston, where Mr. Amos S. Tryon will give any information that may be desired.

While speaking of suspension bridges, we may remark, that we have in our possession much information on this subject including the descriptions in detail of the most remarkable constructions. This is, however, in a form inaccessible to very many. From it could be translated and compiled a volume most useful to the engineer. Should encouragement be offered the work would be undertaken.

We are happy again to hear from C. R. W., the more so since we have found that free and candid discussion has already brought out much information on this all-important subject.

We call attention to some curious results mentioned in the communication.

We would also express our hope that Mr. Campbell will accomplish his object, and that C. R. W. may be able to afford him the satisfactory, and we also hope substantial, proof mentioned below.

To the Editors of the Railroad Journal:

GENTLEMEN—In your editorial remarks on a communication in your paper of the 9th of July, you show yourselves friends to fair manly discussion, without that overweaning fastidiousness which would prevent one man differing from another for fear of giving offence. You state very truly that my views have been mistaken, and, I have no doubt, with equal truth, that I and others have mistaken the intent of Mr. Seymour's report, though the general terms in which these great performances were mentioned very naturally led to the conclusion that they might be safely calculated on in practice.

My former communication was written immediately after a discussion on the subject of grades, in which these very experiments were brought forward to prove that the "late improvements" rendered it inexpedient to incur any serious expense in keeping the grade within 24 feet per mile. Under these circumstances I expressed myself somewhat stronger than was perhaps absolutely necessary; and, on that account, shall not animadvert on the introduction of Mr. Campbell's next argument in enginery, or his assumption of superiority, but beg leave to assure that gentleman that, next to himself, no member of the community will be better pleased with his success than I shall, of which it may be in my power to afford him most satifactory proof, even should the power of his engines be only half of what he so confidently anticipates.

Your scientific correspondent, W. L., must refer to some other communication than mine, when he says that I assert, that an $8\frac{1}{2}$ tons engine will take 100 tons up an ascent of 25 feet per mile, or that there is any discrepancy in Mr. S.'s statements of the *relative* power of locomotives on a level or inclination. It was the *absolute* power of the engines which I questioned; and in endeavoring to investigate the question, made a great error, which has unaccountably escaped notice. I assume the adhesion at $\frac{1}{12}$—it should be $\frac{1}{8}$; and as Mr. S. justly remarks, the extra weight of the engine should be taken into the account. Making this alteration, we have $\frac{8\frac{1}{2}}{8} \times 224 = 238$ tons gross, as the maximum load on a level, in place of 119, as given in my former communication. I have here changed the value of the traction from $\frac{1}{211}$ to $\frac{1}{224}$, as given by Mr. Knight in his last report, and the result does not differ materially from Mr. S.'s statement.

W. L. also appears to confound the traction of the carriages, depending on the friction of the axles, with the power of the engine, which is limited by the adhesion of the wheels to the rails; for the inclination, which will place the cars in equilibrium, must infallibly give the value of the traction. Thus Mr. Knight estimates the traction at 10 lbs. per ton $= \frac{1}{224}$ of the load $= 23.5$ ft. per mile; de Pambour at 8 lbs. per ton $= \frac{1}{280}$ of the load $= 18.8$ per mile.

This able correspondent furnishes himself a striking instance of the tendency which these "flattering statements" have to mislead even the best informed.

This gentleman assumes the traction at $\frac{1}{400}$, as given some years since by the B. & O. Railroad Company, while by looking into the last report, he will find it estimated 10 lbs. per ton $= \frac{1}{224}$ in practice. By substituting this value of the traction in his equation and subsequent calculations, he will find the difference in favor of stationary power reduced nearly one half.

This last report of Mr. Knight's contains a mass of information extremely useful to the public; and by comparing his experiments with those of de Pambour, it appears that American engines are very far superior to English ones, but that the English cars or roads exceed ours in the ratio of 4 to 5 in reducing the traction.—This latter circumstance is curious, and worthy of notice.

This same report also gives the cost of the branch road to Washington, and this is decidedly the severest commentary on steep grades which has yet fallen under my observation. On the Liverpool and Manchester Railroad the passengers are taken over grades of 55 feet per mile, without the aid of auxiliary engines, and as the revenue of the road between Baltimore and Washington will be derived principally from passengers, and as their engines are decidedly more powerful than English ones, the above grade of 55 feet per mile would offer no obstruction to the business of the road, and would certainly have lessened the cost of grading very much, for the present road has no steeper grades than 20 feet per mile. This is certainly carrying out the principle of "forcing a line," to such an extent that like the "medecin malgre' lui," I shall find myself forced into the ranks of the advocates of high grades. It is therefore clear that these extraordinary feats are received by the Baltimore and Ohio Company merely as tests of the power of their engines, and not as furnishing data for their practice, which is regulated by the soundest principles.

In conclusion, I observe that, if I have presumed to question, not the accuracy but the propriety of adopting any of the improvements of the B. & O. Company, I have never for a moment forgotten the difference between the author of original investigations of difficult subjects and the mere critic. Should ever the latter detect a flaw, a man of Mr. Knight's abilities will be the last to consider himself infallible; for there can be little doubt that he who never makes a mistake, will seldom do anything creditable to himself, or beneficial to the community.

Your obedient servant,

C. R. W.

Montreal, July 18, 1836.

Messrs. Editors—I have observed in your paper of the 16th inst., a communication from Mr. W. Norris of Philadelphia, prefaced by yourselves with a hope that some

one would take up the facts it contained, and reconcile them to theories hitherto adopted.

The facts are, that an engine weighing 14.930 lbs. drew itself, and a load weighing 19.200 lbs. after it, up an inclined plane, 2.800 feet long, ascending 196 feet, which is at the rate of 1 in 14 $\frac{285}{1000}$ (and not 1 in 13 as then stated) and that it passed over the plane in the space of two minutes and one second, or at the rate of 15 $\frac{77}{100}$ miles per hour (instead of 14$\frac{3}{4}$ as there stated). And that the pressure on the boiler was a fraction under 60 lbs per square inch.

The data given will admit of a comparison with established theory, on only one point, and that point simply the adhesion of the wheels of the engine on the rail—and to follow out the comparison on this point will take but a moment.

All who are acquainted with the history of railroads and of locomotive engines know, that various experiments have demonstrated the maximum amount of adhesion to be at least $\frac{1}{6}$ of the weight. Now let us see what power the engine exerted during the experiment, and this will be the amount of adhesion in the present instance.

Pambour's recent experiments on the friction of Railway carriages, gives the amount at 8 lbs. per ton of 2240 lbs. and 8 lbs. per ton, increased friction of the engine machinery, on account of the load. The friction of an engine, on a level road without any load except itself is 15 lbs. per ton, of its own weight.

Then if we apply the foregoing to this case we shall have for the friction of the engine 100lbs.
for the friction of the load 68 "
and the gravity of the engine and load is 2.389 "
It will be seen that the friction of the load, + the gravity of the engine and load, is equivalent to the friction of 307 + tons, therefore we must add for the increased friction of the engine machinery 307 "

Making the total amount of resistance, and of course of adhesion 2,864 "
And if we take $\frac{1}{6}$ the weight of the engine we have 2.488 "

Showing a discrepancy between theory and this experiment of 376lbs. which is a fraction less than $\frac{1}{7}$, say 15 per cent in all.

Without knowing the dimensions of the cylinders, and of the working wheels, as well as the length of the stroke of the pistons, it is impossible to judge of the performance of the engine, or to compare it with former theories.

It has been supposed that an ascent of 830 feet per mile would limit the progressive motion of a Locomotive engine upon ordinary railroads: but if the above data is correct, it would be increased to 1013 feet per mile. It will be seen that there are two errors in Mr. Norris' statement, and will it be uncharitable to account for the discrepancy with theory, by supposing that possibly there is yet some other mistake, about the length or height of the plane, or the precise weight of the engine, or load? so that after all, the wonderful performance will turn out to be nothing more than what every man faimiliar with railroads, and Locomotive engines would have predicted before hand. For my own part, I cannot see any thing very remarkable in the fact, that a Locomotive engine, which can of course run itself up a plane ascending at the rate of 800 feet per mile, should draw 19.200 lbs. after it, on a plane ascending at the rate of 369 feet per mile, at a velocity of 15 $\frac{77}{100}$ miles per hour. If the adhesion of the wheels is greater than the resistance of the load, it is very evident that the velocity will be just in proportion to the amount of steam applied.

After all, it should not be forgotten, that the same amount of power, as was exerted by this engine during the experiment, will draw itself and a load of 307 tons after it on a level road at the same velocity that it will draw itself and 19.200 lbs. including the tender on the said plane. If the weight of the tender was 3 tons, then the amount of load, beside the engine and tender, was 5 $\frac{57}{100}$ tons, and it would require 54 additional engines of the same power, to help this one up said inclined plane, with its proper load for a level road.

Yours, &c.

WM. H. TALCOTT.

Albany, July 25th, 1836.

"EASTERN RAILROAD COMMENCED.—Yesterday afternoon ground was broken on the Eastern Railroad: or in the language of the workmen this "Railroad was broken." It was a sudden commencment, and we learn that, although the work on the whole route had been previously contracted for, it was not determined until yesterday morning at a meeting of the Directors, that the work should commence in due form, on that day. At 4 o'clock, P. M. the Directors being present at East-Boston, Col. Geo. Peabody, President of the Board, made a brief and appropriate address, the substace of which was, that as the Company had surmounted many obstacles in obtaining the charter, so they were determined to overcome all obstacles in the speedy completion of the Road. Holding spades in hand, he and the other Directors, suiting the action to the word then dug up a portion of the sod, placed it in the barrows, and wheeled it into the valley. Thus was commenced the good work of internal improvement. The regular workmen, with their carts and implements, then took up the work in earnest. We learn that contracts for the whole route to Newburport have been completed with responsible men, at five per cent lower than the original estimates of the Chief Engineer, and that in the course of a fortnight, from 1200 to 1500 men will be employed on the whole route to Newburyport. This work, thus auspiciously commenced, is not only interesting to the stockholders, but to the people of Boston generally, and of the whole eastern section of the State, and Maine. There is nothing to prevent the completion of the work within the time originally proposed. On this occasion, a notional salute of 26 guns was fired."

We are pleased to learn that in all the contracts made for the construction of this Railroad, the use of ardent spirits among the workmen is prohibited.

FIRST STEAMBOAT ON ONEIDA LAKE.—By the following proceedings it will be seen that the experiment of steam navigation on the Oneida River and Lake has proved successful. The steamboat "*Seneca,*" owned by Colonel Baldwin, was built, we believe, at Baldwinsville, on the Seneca river, and has passed from that point to the Oswego river, thence up the Oneida river to the Oneida lake, and traversed every part of that lake. The experiment must satisfy all, the feasibility of making these waters navigable for a *large description* of vessels at a trifling expense, and of the reasonable petition of the citizens of the country bordering upon them for Legislative aid in their improvement.

A Brighton wiseacre, according to a journal of that town, has been *preserving* the coin of the realm by inclosing some in a ball of wax, which he placed in a balloon of Indian rubber inflated with gas, so as to raise it several thousand feet above the earth, "*where, floating in space,* the memory of our nation and its monarch *may be recorded for hundreds of thousands of years!*"—*Age.*

VAN BUREN HARBOR.

We publish the following report in relation to Samuel Cushing, Esq. civil Engineer, with a view of disseminating information in which many of our readers have a direct interest.

It appears to be a comparative statement of the capabilities of the different harbors on Lake Erie, between Buffalo, and Erie in Pennsylvania. Of the correctness of the report, we can only judge by the character of the gentleman whose name is attached to it—as we are not, that we are aware of, personally acquainted with an individual interested in the place. It is possible that, in giving place to this report, we may be deemed unfriendly to those places in its vicinity with which it is more immediately contrasted; and it may not therefore be improper for us to say, that our partialities, and prejudices, *if we have any,* are in favor of those, and against their rival, Van Buren harbor, and therefore we ask the friends of Dunkirk and Portland, to furnish us with such reports of actual survey, as will place the whole subject before the commuinty.

TO THE PROPRIETORS OF LANDS, AT

VAN BUREN HARBOR, ON LAKE ERIE,

IN THE COUNTY OF CHAUTAUQUE, NEW-YORK.

GENTLEMEN:—

The survey of Van Buren harbor, upon which I have been engaged during the last month, being completed, I have the honor to present you with a chart, showing the results of the survey, together with the following report.

As early as the season would admit, the survey was commenced, and though much unpleasant weather occurred, it was continued with few interruptions till finished.

On arriving at Van Buren, I was agreeably disappointed in the appearance of the place, having, from want of correct information relative to it, greatly underrated its capabilities. Instead of being low and swampy, as I had expected, the country bordering the Lake is dry and elevated, possessing generally an aluminous soil, with a firm and even surface.

At the distance of from three to eight miles from the Lake shore, a ridge of hills rises from a belt of alluvial country, whose gentle slopes occupied by productive farms, present a pleasing picture of agricultural prosperity.

Between the ridge of hills and the shore the country is slightly undulating, intersected by the courses of rivulets which issue from the hills and discharge themselves into the Lake. Several of these streams are of sufficient importance to furnish valuable mill sites, and they are already occupied for such purposes to a considerable extent. Stone of good quality and easily accessible is procured from the hills, and is much used in the vicinity for building bridges, and other works requiring durability. The country abounds with timber of various kinds adapted to building purposes; white wood, many specimens of which are of gigantic dimensions, hemlock, maple and sycamore are abundant and rendered valuable by the vicinity of saw mills.

Brick of good quality can be made in any quantity in this neighborhood, the soil near the Lake being well adapted to its manufacture, and fuel for kilns being cheap and abundant. The lime used at Van Buren is burnt on the spot, from stone brought from the opposite shore of the Lake.

By examining the chart herewith presented, it will be seen that Van Buren Harbor, is formed by an indentation in the shore of Lake Erie; having on the northeast a sunken reef of rocks extending in a northwest direction, about half a mile into the Lake, and on the west and northwest a point of land, with shoal water beyond it for a distance of seventy-five rods.

The harbor is bordered around its greatest portion by a sloping beach of sand and gravel about fifty feet wide, the upper side of which merges in the clay formation common to the country, and is closely invested with luxuriant vegetation. The point on the western side of the harbor, presents towards the Lake a perpendicular wall of rock about twenty feet in height whose upper surface being covered with a sufficient depth of soil, supports a heavy growth of timber, which from the shelter it affords, adds materially to the safety and convenience of the harbor.

In the vicinity of Sturgeon Point, the rock again appears on the shore though not in the perpendicular bluffs which it exhibits at Van Buren Point; but in lower ledges, with usually a beach of sand and shingle between them and the water. The rock, a species of slate, is found in horizontal layers, of various thickness, intersected by perpendicular seams; it is unfortunately unfit for building purposes, in general, though it answers well for filling the interior of the timber frame work of wharves and breakwaters. To the action of water upon particular portions of this rock, are perhaps to be attributed those singular natural fountains of carburetted hydrogen gas, which are often seen in its vicinity, and which are frequently of sufficient magnitude to afford an economical means of procuring artificial light. In the village of Fredonia about four miles from Van Buren, this gas is extensively used for the purpose of lighting shops and dwellings, and though from the predominance of hydrogen in its composition, it burns with a paler flame than the manufactured gas, it is nevertheless highly approved of by those who use it. At several points in and near Van Buren, the gas is seen rising in bubbles through the water.

The greatest quantity is found in the creek, the position of which is shown on the map, another locality is in the Lake close to the shore, a few rods east of the wharf.

It is doubtful, however, whether these fountains afford gas in sufficient quantities to be available for useful purposes.

The natural capabilities of the harbor, in a commercial point of view, will be perceived, by an examination of the map, to be of considerable importance.

It will not, it is true, bear comparison with Atlantic harbors, either for capacity or safety, but it will lose nothing by comparison with those of Lake Erie, within the limits of the State of New York. In deciding upon the merits of this harbor, it must be judged therefore, not by comparing it with those on the seaboard, but with its own immediate neighbors.

It will be borne in mind, that a perfect harbor must possess most, if not all the following qualities, to wit: Protection from the winds and waves; anchorage ground of sufficient extent to accommodate safely a large number of vessels; sufficient depth of water to admit the largest vessels that may be expected to enter, and one or more points of entrance so situated that ships may enter or leave the harbor in all winds. For the purposes of shelter from storms these requisites are perhaps sufficient, but when the harbor is designed to become a place of resort for vessels where they may not only lie at anchor in security, but may also conveniently load and discharge cargoes, other circumstances must be taken into view. The formation of the adjacent country with regard to its suitability for the site of a commercial city; the facilities for building wharves and warehouses; the health of the climate, and the quality of the water to be used by the inhabitants, and other circumstances of less importance, must be attended to.

It seldom happens that all these circumstances are united in perfection at any one place, on the contrary, it is usually found that in any two harbors, one will excell the other in one or more of them, while in other respects it may be inferior.

The harbor of Van Buren possesses naturally many of the requisites above enumerated. Its entrance being spacious and conveniently situated with regard to the anchorage ground, it is accessible in all winds by sail vessels as well as by steamboats; a ship even with the wind directly ahead, having plenty of room to beat into, or out of, the harbour.

The natural protection of the harbor is good against all winds except those from the north and north west, and these quarters it is proposed to defend by a breakwater, similar to those erected at other harbors on the lake.

It is probably known to you, that most of the harbors on the south shore of Lake Erie require this artifical protection, before they can be considered safe in the severe gales which sometimes occur from the northwest. Buffalo harbor was furnished by government with a breakwater for this purpose, at a cost of more than $200,000. The expense of the breakwater proposed for Van Buren harbor, would not exceed $50,000, while it would protect twenty acres of good anchorage from the force of the northwest gales. This breakwater would be constructed on a less expensive plan than that at Buffalo, which consists of heavy stone, so laid as to be permanent without the aid of timber. The proposed work would be similar to those erected at Dunkirk, and would be formed during the winter of stone and timber united. A crib or framework of timber of the width of the intended breakwater, and of a convenient length, would be made upon the ice immediately over the site of the proposed work; the corners of the frame being securely fastened together, and the whole strengthened by a sufficient number of cross ties.

The framework would then be filled with stone procured from the shore of the lake; during which operation it would gradually sink until it rested safely on the bottom, after which other sections would be added in the same manner till the required length was attained. Seventy-five rods of the proposed breakwater will be founded in less than eight feet depth of water, and the remainder will be between that depth and a depth of eighteen feet. The top of the work should be at least ten feet above the surface of the water, for though some that have heretofore been built are much lower, it is now ascertained from experience, that perfect security cannot be attained with a less height. Provided with such a breakwater located in a proper position, Van Buren

harbor would be well protected from the northwest storms, while it would still preserve an entrance way sufficiently wide to allow vessels to enter or leave it in any wind.

With regard to protection from the northeast, it will be remarked, that the reef from Sturgeon Point extends more than half a mile into the lake, with from three to six feet water on it in ordinary times; and the effect of a northeast wind being to depress the surface of the water in this part of the lake, the depth on the reef is lessened at such times, and its effect in breaking the swells, is in consequence proportionally increased. The same cause therefore, which renders protection necessary in this quarter is instrumental in producing it at the very time when it is needed.

Further protection than is afforded by the reef would doubtless be desirable, from the greater comfort that would thence ensue to vessels lying at the wharves during a northeast storm; but as a means of affording additional *security*, it would scarcely be of sufficient importance to warrant much expenditure. The heaviest waves produced by a northeaster are now checked and broken into foam by the rocks of the reef, to the leeward of which the surface is comparatively calm, and free from those dangerous white-crested seas, whose effects are most to be dreaded.

From the opportunities I have had of seeing the harbor under the influence of a strong northeast wind, I do not doubt that a vessel might lie there securely at anchor in any gale likely to occur from that quarter. The depth of water in the harbor, as will be obvious from an inspection of the chart, is amply sufficient for any vessels navigating Lake Erie, none of which, I am informed, draw more than nine feet when loaded, and a large proportion of them not more than eight. At the head of the present wharf at Van Buren, there is eleven feet of water; and at no place between this and the entrance of the harbor is there less than ten and a half feet.

Having thus shown the importance of Van Buren harbor, by describing its capabilities without reference to those of other harbors, I shall, for the purpose of showing its advantages in a stronger light, compare them with those of some other places that I have examined. One of these is Portland harbor, situated about fourteen miles southwest of Van Buren, and having a breakwater and lighthouse. The position of this harbor is such that it can scarcely be made secure without great expense, being entirely open to all winds except those from the south and west. The breakwater extending from the shore, in a northerly direction, about six hundred feet into the lake, is consequently serviceable only in winds from the west, and the facilities for further protection are quite limited. The place, in short, is deficient both in capacity and security. It will doubtless be a convenient place in good weather for steamboats to touch at, in their progress up and down the Lake, for the purpose of landing freight and passengers; but for a port where vessels are to lie in all weathers, its capabilities are quite too limited. The bold and rocky character of the shores to the eastward of the breakwater forbid the idea of occupying them for wharves and warehouses, even if they could be protected from the force of the waves. This harbor, if such it may be called, is in all respects greatly inferior to Van Buren.

The place to which your attention will now be directed, is Dunkirk harbor, situated about five miles northeast of Van Buren.

The chart of this harbor, herewith presented, was taken from a survey made last autumn, by T. S. Brown, of the U. S. Engineers, whose reputation is a sufficient guarantee for its accuracy. Being drafted on the same scale as the map of Van Buren harbor a comparison of the two may be easily made, and the wide difference between them will be obvious at a glance.

The bottom of the harbor is a basin principally of smooth rock, having in its deepest part a bed of clay, which has probably been washed from the adjacent shores during the storms, and deposited in this place.

At the northwest extremity of the harbor is the main channel, or entrance, being two hundred and sixty feet wide, and eleven hundred and fifty feet long, running in a direction nearly east south east.

This position of the entrance is decidedly a bad one, and taken in connexion with the length and contracted width of the channel, constitutes a very unfavorable feature; for in consequence of its position on the northwest side of the harbor, there must always remain in this most exposed situation, a space open to the Lake, as it cannot be here fortified without entirely closing the entrance, or otherwise making it highly inconvenient and dangerous. It will hence ensue that a vessel lying at the wharves or at anchor in front of them will have nothing interposed between her and the northwest gale, which, coming through the opening, will sweep the harbor with a fury scarcely less than it exhibits on the open Lake; and when it is considered that the most tremendous gales experienced on Lake Erie usually come from this quarter, the disadvantages of an opening here, will be apparent. It will further be observed that the northwest breakwater at this harbor, though it is unquestionably of great utility in diminishing the dead swells, does not directly shelter any portion of its waters, excepting such as are too shallow to be approached by vessels, while a breakwater of the same length at Van Buren harbor would protect twenty acres of good anchorage from the northwest storms.

With regard, then, to the important requisite of protection against gales from the northwest, it must be obvious from what has been said, and from an examination of the charts, that in this particular Van Buren harbor, with the proposed breakwater, would have greatly the advantage over Dunkirk. Against the northeast storms the natural protection of Van Buren is superior to Dunkirk, and its facilities for artificial improvement in this quarter are at least equal. As yet there has been no breakwater erected in this direction at either harbor.

Another characteristic of Dunkirk harbor, which must be considered as very unfavorable, is in the nature and formation of its principal entrance. In consequence of its great length, and contracted breadth, it is inaccessible in head winds, to sail vessels without the aid of steam power, and it can never be safe to enter it in any wind when blowing strongly. A vessel running up the Lake in a northeast storm, with the intention of seeking shelter in Dunkirk harbor, would approach the entrance with the wind directly abaft; in order to enter the harbor, she must then turn a right angle, and with the wind on her beam, pass through a channel eleven hundred and fifty feet long, and two hundred and sixty feet wide; a manœuvre, which, at such a time, is manifestly full of danger. Van Buren harbor, on the contrary, as is evident from the chart, can be entered, or departed from, in any wind, its entrance being sufficiently spacious, in regard to breadth, and depth, to admit of beating either into, or out of, it. The space between the head of the proposed breakwater, and a depth of nine feet of water opposite to it, is twelve hundred feet wide; and as this is the narrowest part of the entrance, a ship in beating into, or out of the harbor, would seldom be obliged to make a tack so short, even, as this. Hence it is plain that Van Buren harbor is superior to Dunkirk, not only in point of safety, but also in facility of access. It is, moreover, at least equal to it, in the quality of its anchorage, and in the opinion of masters of vessels, who are acquainted with both harbors, Van Buren has greatly the advantage also in this respect. It will be perceived also from the formation of the two harbors, and the depth of water in each, that the facilities for building wharves, are greater at Van Buren, than at Dunkirk. At most points in the latter harbor, they will require to be nearly double the length, to reach deep water, than will be necessary at Van Buren.

From a review of all the circumstances it will be evident that Van Buren harbor is not only intrinsically valuable for its natural capabilities, but that it becomes still more so by comparison with its immediate neighbors.

In conclusion I would state, that without prejudice in favor of, or any interest whatever in, this harbor, I have formed the opinions expressed in this report, from the facts developed by the survey; and I have the satisfaction to know, that in these opinions, I am supported by some of the ablest Engineers and most experienced sea Captains in this country, to whom the charts have been exhibited, and who have without any exception given opinions coinciding with those herein expressed.

I am, gentlemen,
with great respect,
your ob't. serv't.

Providence, July 22, 1836. S. B. Cushing.

CLEAVELAND, WARREN, AND PITTSBURGH RAILROAD.—This is part of the great line of communication connecting the country on the Upper Lakes with the cities of Philadelphia and Baltimore. It is therefore of little less importance to the prosperity of Michigan, than if it lay wholly within the limits of the State.

The route has been examined recently by an engineer, and estimates made of the expense. some considerable obstacles occur on the eastern part of the route; the greatest is the Rock Bluff near Youngstown, which will require about 35,000 cubic yards of rock excavation, and as many of earth The greatest ascent or descent is not more than 40 feet per mile. The distance from Warren (Ohio) to the Pennsylvania line, is 23 miles, and the expense of grading and bridging is estimated at a little less than four thousand dallars a mile.

A meeting of the Directors have ordered that 5000 additional shares of stock be created, and that the same be sold in the cities of Pittsburgh, Philadelphia, and Baltimore. It was likewise ordered, that the first five miles of the road commencing in the vicinity of Erie street in the city of Cleaveland, be located and put under contract, on or before the first of September next; and that a further portion of the road not less than twelve miles, be put under contract on or before the first of October next.—*Detroit Jour. & Cour.*

NICKOLL'S PATENT CONDENSING RAILWAY LOCOMOTIVE.

Sir,—I beg to invite the opinions of your correspondents upon the following proposed improvements upon my plan (*Mechanics' Magazine* No. 635,) for a railway condensing locomotive.

The boiler being constructed and situated as before described and represented, I would substitute in the place of the two equi-angular crank condensing engines, D, two double-acting high pressure engines, with the addition of a condensing apparatus (consisting merely of an enlarged air-pump,) which I would fix in the place of the condenser F; the apparatus in question, together with the hot-water pump, to be worked through the medium of a cross-head and separate cranked shaft, by an excentric, from the shaft of the engines.

Concerning the refrigerator for cooling the hot water of the condenser, late experiments have convinced me, that to maintain the cooled water, even at the temperature 80° Fah., an evaporating superfices of full 200 feet, per horse power would generally be desirable.

It is not necessary to employ the draft of a furnace, or other means, to produce a current of fresh air in the refrigerator—for moisture, so far from loading the air with its weight, communicates, like heat, increased expansion and elasticity; conseqeuntly, as by reason of the heat and vaporisation of the hot water in the refrigerator, the specific gravity of the air therein would be lessened, so by a little elevation of the eduction air chambers T, the refrigerator would establish a current of fresh air for itself.

With a given quantity of steam, I anticipate about one-twelfth greater effect by the employment of my high pressure condensing, instead of the ordinary high-pressure locomotive; but the steam blast being wanting in the condensing locomotive, the expenditure of fuel might perhaps exceed in a sixth ratio what might be required in an uncondensing locomotive; the ultimate economy, however, (to pass by other well-known inconveniences of the steam blast,) I apprehend to be more than questionable, because of the powerfully exfoliating influence of the very intense heat which the blast occasions upon the thin and oxygensible material of which locomotive boilers are, and, with our present knowledge of metallurgy, must be constructed. Yet, if in no other point of view, assuredly as respects economy in the item of water, the superiority of my condensing, as compared with the ordinary locomotive, may be admitted—first, on the grouud of the presumed somewhat more economical application of the steam; secondly, from the cooling influence of successive currents of fresh air upon the hot water of the refrigerator; and thirdly, from the vaporisation of a given weight of water, say of the temperature 100° Fah., (according to what one may infer from lately published experiments of Desormes,) absorbing about one-third more caloric, than steam evolved of four atmospheres elasticity.

I am, Sir, your obedient servant,

J. W. NICKOLL.

STEAM CONVEYANCE BETWEEN PADDINGTON AND THE CITY FOR HIRE.

Mr. W. Hancock, whose perseverance certainly deserves success, commenced running his steam carriages, the "Enterprise" and "Erin," on Wednesday morning last, at nine o'clock, from the station in the City-road to London Wall; from thence he proceeded to Paddington, and returned to the city. On the first day he performed three of these journeys, on the second, four, and on the third (yesterday,) two, before noon. The average time of travelling over the above ground has been 1 hour and 10 minutes, including stoppages to take in passengers, water, and coke. This is just half the time the horse-omnibusses take in going over the same ground. In the nine journeys performed, the number of passengers carried was 220, averaging about 12 persons each single trip. Mr. Hancock intends to run his carriages regularly the same number of journeys daily, for the present, and very shortly to increase the number.

Lond. Mec. Mag.

THAMES TUNNEL.—The excavation made for the Thames Tunnel is about 38 feet in width, and 22 feet six inches in height, presenting therefore, an opening exceeding 850 feet. The whole of this excavation including its two sides, which may be computed at 400 feet, is secured by means of a powerful apparatus designated the shield, as is also the roof of it, which measures 350 feet. At full tide, the weight of both earth and water, which constitute *the superincumbent pressure*, is not less than 700 tons.

The *ceiling* of the shield consists of 24 or 26 pieces of cast-iron, denominated staves, closely adjusted; and as they are sometimes made to relieve each other, and therefore subjected to an increased load, they are, for greater strength, made like inverted troughs of cast-iron; their breadth is 18 inches, the depth of their sides 7 inches, and their length 9 feet, independently of a tail of wrought-iron which overlays the brick work. The edges in front are made sharpe for entering the ground, and the external surfaces of the staves are planed very true. Similar staves are laid against the sides of the shield, all planed and equally well adjusted; each stave can be impelled singly as sheet piles are. Upon the whole the shield may be viewed as a coffer-dam, which, instead of being moved in a perpendicular direction, is placed and impelled horizontally. The standing part of the shield consists of 12 parallel frames all independent of each other.

The front of this vast excavation is protected in a different manner from that of the sides. It is panelled all over with small boards, each of which is 3 feet long and six inches wide. There are, therefore, upwards of 500 of these boards, technically called *polings*, for covering the whole face of the excavation. Every one of these polings is held in place, and secured by means of two hand-jacks or screws, abutting against the frames. There are, therefore, upwards of one thousand of these jacks in action for securing the face of the excavation, or rather, for pressing against the ground with sufficient power to prevent any disruption of its various strata for; were the ground to be at all deranged, the pressure against the sides and front of the shield might soon increase to 2,500 or 3,000 tons, independently of that of the superincumbent pressure.

It is further to be remarked, that every successive tide, which at its full head is 76 feet above the foot of the excavation, causes an incessant variation in that pressure, tending to strain the hard strata, and to soften or knead the intervening soft ones; a uba quite unnoticed by projectors of plans fter, which proved fatal to those who attempted the drift-way under the Thames in 1808. The pressure exerted against the front of the excavation by the agency of the shield, must therefore be uniformly kept at a maximum. The shield is advanced only 9 inches at a time, while the brick structure proceeds simultaneously.

It would be well if those who feel disposed to enter the list of competitors were first to consult the report of those miners who directed the attempts that were made and carried on with so much perseverence, between the years 1803 and 1808, with the ultimate object of opening a road-way under the Thames at Rotherhithe. These were miners (Cornishmen,) engineers in that branch of the art, and, consequently, eminently qualified for the task in every respect; they were as sanguine too, as any of the projectors of this day; and their excavation was limited, in the first place, to a simple driftway, the height of which was only 5 feet, the breadth 2 feet 6 inches at the top, and 3 feet at the bottom, forming, therefore, an excavation that was sixty times smaller than the excavation which has been made for the Thames Tunnel. Diminutive, however, as this hole was when contrasted with that of the Tunnel, the ground of the roof, though supported by substantial planking, gave way once in a fluid state, leaving an unsupported cavity over the roof of the drift-way; still it held

itself up; but a second accident of the same nature having occurred under a very high tide, the river broke the ground and entered the drift. In both cases it was the loose ground that first forced its way into the drift, and the river afterwards. The miners succeeded in filling the hole and in re-entering the drift, but the men could not continue the working; they were, according to the engineer's report, *driven out of it by the frequent bursts of sand and water*, and it was acknowledged by him to be quite impracticable to proceed farther; so, after having probed the ground from underneath in many places, he concluded and reported that it was impossible to make an excavation of any size under the Thames.

But he resorted to one expedient which he conceived would answer the emergency—one which, at any rate, demonstrates the intrepidity of this engineer. That is, in order to clear or pass through the place which had been filled up in closing the hole made by the breaking in of the river, he reduced the height of his drift from 5 to 3 feet. The men and the engineers, too, had therefore to work on their knees. Awful enough for such a task! Thus reduced, the area of the excavation of this drift hardly exceeded the one-hundreth part of that of the Thames Tunnel under corresponding circumstances. —*London Mechanics' Magazine.*

From the Times.

ALBANY AND WEST STOCKBRIDGE RAIL-ROAD.—A report of the superintendent of this work is before us, accompanied by a report of the Engineer, showing the result of a very extensive survey of different routes, the capabilities of the country to sustain the road, with many other interesting facts. Three entire routes have been surveyed and estimated upon, one of which runs directly by Lebanon Springs, twenty-five miles from Albany, at which there were last year seven thousand visitors.—The distance upon this route from Albany to Stockbridge, is 41 3-4 miles, and can be constructed upon a grade which will in no instance exceed forty feet ascent per mile, which is only 2°1-2 feet per mile more than occurs on the Boston and Providence road for five miles together. The cost of the road laid with entire iron rails, is estimated at $347,529 exclusive of carriages and depots, which is about $15,500 per mile.

The annual income of the road, from passengers and freight is estimated at $179,304, from which is deducted, for expense of operating, repairs, &c, $63,515, leaving a balance of $115,788, being an interest of more than 18 per cent. on the entire cost. Should the route by the Springs be adopted, about $33,000 should be added to the income of the road without increasing the expense of operating it.—In this estimate very little is put down for New-York and Albany travel, which will all pass over this road whenever the New-York and Albany road is made, which, it is said, is soon to be commenced. The railroad from Boston to Albany, now going forward, connects with this road at West Stockbridge, and the New-York and Albany road will connect at the same place; so that it is to become not only a part of the line of road from New York to Albany and the West, but is to be the thoroughfare through which all the interior of New-England is to be supplied with bread stuffs from our canals. There are no canals to compete with this road, either for freight or passengers.

The superintendent concludes his report by remarking that, "From the report of the Engineer, show the business to be done upon the road, the accession to that business within the reach of the company by going by the Lebanon Springs, and the probable construction of the New-York and Albany road, bringing the entire winter travel, and much of the summer travel, between those two places over the entire line of this road, it cannot be doubted that it presents some of the best railroad stock in the State.

This is the most difficult part for constructing a railroad from this city to Albany, to connect with the railroads running thence to the west and north, and it is gratifying to learn that a route has been found so easy in its grades and so cheap of construction, and it is hoped our citizens will take a proper interest in an object so desirable as that of opening a communication by railroad between this city and Albany, and especially so, as the prospect is so fair for a profitable investment.

The books for subscription are to be opened on the 27th inst., as will be seen by the notice in our advertising columns.

HEIGHT OF BAROMETER, &c. NEAR THE TOP OF CHIMBORAZO.—On his ascent of Chimborazo, M. Bossingault found the barometer to stand at 14.47 inches at 2 P. M., the thermometer being at 46° Fah. The height above the level of the sea was 6004 metres (6670 yards.)—*Ibid.*

INTERNAL IMPROVEMENTS.—The following extract from the Oswego Advertiser of the 9th, is the best practical proof we have seen of the Oneida Lake, River, and Seneca River being now navigable for Steamboats, and in a fair way, we trust, of being improved for a Ship canal. With a very moderate expenditure, in proportion to the advantages to be derived, one of the most beautiful and picturesque routes to Niagara Falls can be opened, viz: by steamboats to Albany; railroad to Utica; packet, to the head of Oneida Lake, and then through this Lake and river with steam, to Oswego. This beautiful sheet of water, 22 miles long, is studded on its margin with fine farms; its banks gradually rising to 300 feet in the distance of a few miles from its gravelly shores.

One hundred thousand dollars was asked of the last Legislature, to improve the outlet of Lake Oneida and the Seneca River to the inlets of Cayuga and Seneca Lakes. An able and favorable report was made on this subject by Genearl Borland, chairman of the committee on canals.—The application was late in the session, and the necessity that then existed to invest the cost of the Erie and Champlain Canal debt, so as to carry the salt and auction duties to the general fund, was, it is understood, the principal cause which prevented the subject being acted on

A glance at the map of the State of New-York will show the propriety of improving the channels of trade, between Lakes Oneida, Cayuga, Seneca and the other small Lakes, lying *in the centre of the State*, with which canals and railroads are connected—and in one instance to the south by Ithaca and Owego, to the coal and iron mines of Pennsylvania, whilst on the north by Oswego, and the contemplated Sodus Bay Ship Canal, we are brought in connection with Canada, and by the Welland canal, with the "Far West."

A new era is now opening to the State of New York in internal improvements. The constitutional difficulty that heretofore existed, to take any part of the revenue, derived from the tolls on our great work, the Erie canal, until after the debt was provided for, has passed by.

We have now productive works of internal improvements, which, with the salt and auction duties, produce us alone one million and a half of dollars per annum—yearly increasing—and without one cent of State tax.

The policy and prudent course pursued by our State Officers, in husbanding the revenues of our Canals for the extinguishment of the debt, for their cost, has been blamed by the inconsiderate, and they have been stigmatized as unfriendly to internal improvements. A moment's reflection will show it is not so. It was the only course for an able financier, A. C. Flagg, to pursue. The constitution the tolls of the Canals——salt and auction prevented duty being directed to any object, until their cost was provided for. There was in reality no necessity for taxation, although recommended by Governor Marcy, with the view, no doubt to provide for any deficit (as our general fund was nearly exhausted, having been mainly expended to build our canals,) for a liberal State expenditure, and for the interest, on any loans, for internal improvements, then claimed from various quarters.

The people, through their representatives, would not tax themselves;—their good sense pointed out to them a mine of wealth in their system of internal improvements. They waited patiently until the Comptroller announced, the last winter, to the Legislature, that the period would arrive—1st July, 1836—when the debt for building the Erie and Champlain canal could be provided for and safely invested. The pledge has been redeemed. The last Legislature (which has only one parallel in this State) covered themselves with honor, in their acts, to build the Black River and Olean canals, and for the liberal aid they yielded in the credit of the State of three millions of dollars to build the Southern railroad.

The long list of railroad charters, crossing the State in every direction, is further evidence of their desire to promote internal improvements. We look forward with confidence, to the next Legislature, to improve the *natural* navigation; connecting our inland Lakes by removing all obstruction to a navigation of at least seven or eight feet water, *with locks to pass steamboats*; destined to supersede sails, at no distant day, with as much certainty as steam will supersede sails on the Hudson; and is yearly getting into more use in our coasting trade, and will be largely used, in steam frigates, for our naval defence. B.

METEOROGICAL RECORD,

For the month of November, 1835, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10′ N., Long. 91° 59′ W.,) by P. G. VOORHIES.

NOVEMBER.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	52	64	60	calm	clear	
2	55	70	62	..	..	foggy morning
3	60	71	69	SE	cloudy	rain all night
4	65	64	64	calm	..	heavy rain all day and all night
5	64	65	65	SE	..	clear evening
6	58	65	61	calm	clear	
7	52	78	68	..	cloudy	
8	64	67	66	..	..	a little rain
9	62	66	64	..	..	rain at noon—clear evn'g
10	65	72	68	S	..	heavy rain and thunder all day
11	44	49	49	N	clear	
12	41	51	48	NW	..	first white frost
13	42	66	62	NE	..	. .
14	58	70	67	SE	cloudy	heavy rain all night
15	57	78	74	S	..	
16	58	64	60	calm	..	rain all day and all night
17	55	68	59	..	..	. . .
18	58	76	74	SW	..	
19	74	79	75	..	..	high wind at noon
20	71	78	66	calm	..	showers—rain at noon
21	57	59	56	NE	..	. all night
22	47	49	46	N	..	rain at noon and evening
23	42	50	45	NW	clear	
24	36	45	42	N	..	
25	32	47	46	NE	..	
26	38	50	48	calm	..	cloudy evening
27	41	43	42	..	cloudy	drizzling rain all day
28	38	54	43	..	clear	
29	32	51	48	..	..	heavy white frost
30	34	68	62	..	..	

Red River fell this month 3 feet—below high water mark 5 feet 11 inches.

METEOROLOGICAL RECORD.

For the month of December, 1835, kept at Avoylle Ferry, La., (Lat. 31° 10′ N., Long. 91° 59′ W.,) by P. G. VOORHIES.

DECEMBER.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	49	64	61	calm	clear	
2	50	65	63	NE	..	
3	51	70	68	SE	.	cloudy and calm in the afternoon.
4	55	75	67	calm	..	Red River rising
5	52	59	53	N	cloudy	clear at noon
6	34	64	56	..	..	white frost
7	38	67	53	calm	..	
8	51	59	52	..	clear	
9	53	62	56	..	cloudy	rain all day and all night
10	54	50	50	N	..	. . .
11	36	50	41	calm	..	
12	33	51	50	..	clear	heavy white frost
13	32	60	54	..	..	. .
14	40	62	59	..	..	white frost—cloudy in the afternoon
15	39	67	62	..	..	
16	41	68	62	..	..	white frost
17	46	72	67	..	cloudy	foggy morning
18	60	72	68	S	..	clear at noon and rain all night
19	67	74	68	SE	..	
20	58	76	54	NW	..	rain in the morning and clear in the evening
21	46	62	58	calm	clear	
22	43	53	49	..	..	heavy white frost
23	32	56	52	..	..	
24	52	58	65	SE	cloudy	rain all night
25	53	62	56	calm	..	light showers all day
26	54	64	57	..	..	Red River on a stand
27	49	55	51	..	..	clear at noon
28	44	61	58	..	clear	light white frost
29	42	48	62	..	..	Red River falling
30	45	70	66	..	..	
31	42	68	62	..	..	white frost

Red River rose this month 2 feet 3 inches—below high water mark 3 feet 8 inches.

GREAT SOUTH CAROLINA RAILROAD.—The project of constructing a Railroad from Charleston to the Mississippi valley—extending it to Cincinnati—is awakening very general attention through the region of country to be effected. A large convention is now in session at Knoxville, upon the subject. Georgia sent a delegation to the convention; but although they knocked at the door, the South Carolinians would not "let them enter"—except as spectators. They will not allow Georgia to have any thing to do in the matter.

COLOUR OF THE SKY AS SEEN FROM HIGH MOUNTAINS.——M. Bousingault comparing his own observations upon several high mountains, is disposed to attribute the blackness which the sky sometimes presents, to the effect of strong light reflected from the snow and ice upon the eyes. He observed a remarkable difference of tint in the sky seen from the highest point of Chimborazo which he was able to reach, and from the plain. On the ascent of Antisana at a much lower elevation, the sky seen from the icy plain appeared black, and in the evening of the day of observation he was struck with snow-blindness.

In no ascent has he been able to see the stars in day time, an experiment which he made fully in his ascent of Chimborazo.—*Ann. de Chim. et de Phys.*

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co., July 25th, 1836.

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cut stone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unkown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.

E H. GILL, Chief Engineer. 30—to10

TO CONTRACTORS.

Sealed proposals will be received at Jackson, until the 15th day of September next, for the graduation, masonry and bridging of the 3d division (50 miles) of the Mississippi Railroad.

This road is located on a pine sandy ridge, the country is healthy, and provisions can be readily obtained at all seasons of the year.

The whole line (150 miles) will be placed under contract, as the location advances next fall; and it is believed that no institution can offer greater inducements to good Contractors than this.

F. H. PETRIE, Chief Eng.

ENGINEERS OFFICE, Natches, June 10, 1836. 23—till Sep. 5.

TO CONTRACTORS.

ENGINEER DEPARTMENT, Lawrenceburgh and Indianapolis Railroad Company, June 20, 1836.

PROPOSALS will be received at this office until the 8th of August for the graduation and masonry on the first division of the Road.

This division commences near the Ohio River at Lawrenceburgh, Indiana, and follows the Valley of Tanners Creek a distance of ten miles.

Plans and Profiles of the Route and proposed works can be examined at the Engineers Office, Lawrenceburgh, Dearborn County, Indiana.

28—tau15 JULIUS W. ADAMS, Engineer.

TO CONTRACTORS.

PROPOSALS will be received at the Office of the Eastern Railroad Company, Boston, between the 28th and 30th inst., for the grading and masonry of said Road from East Boston to Newburyport, a distance of 33¾ miles

The line of this road is along a favorable country, passing threugh Lynn, Salem, Beverly, and Ipswich, which places will afford contractors every facility for obtaining provisions, &c. Plans and Profiles will be ready, and may be seen at the Office, after the 22d instant.

Satisfactory recommendations must accompany the proposals of those who are unknown to the Engineer.

JOHN M. FESSENDEN, Engineer.

22—t30j

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

								lbs.	
350 tons	2½	by	½,	15 ft in length,	weighing	4 $\frac{68}{100}$	per ft.		
280	" 2	"	½,	"	"	"	3 $\frac{50}{100}$	"	"
70	" 1¾	"	½,	"	"	"	2¾	"	"
80	" 1½	"	½,	"	"	"	1 $\frac{25}{100}$	"	"
90	" 1	"	½,	"	"	"	½	"	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2¾, 3, 3¼, 3½, 3¾, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

TO CONTRACTORS.

Engineer Department York and Maryland Line Railroad Co.

YORK, JULY 10, 1836.

PROPOSALS will be received until Saturday, the 30th inst. in York, for the graduation and Masonry of the whole line of this road, extending from the State line to York, a distance of nearly 20 miles. This road is a continuation of the Baltimore and Susquehannah Railroad, and is the final letting on the line of Railroad from York to Baltimore. On this letting is a Tunnel of about 300 feet in length.

Persons unknown to the undersigned must accompany their proposals with recommendations.

ISAAC TRIMBLE, Chief Engineer.

WM. GIBBS M'NEILL, Consulting Engineer.

July 15, 1836. 28—t30

OFFICE PONTCHARTRAIN, RAILROAD CO. New Orleans, 19th May, 1836.

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,

JNO. B. LEEFE, Secretary.

28—3m.

NOTICE TO CONTRACTORS.

PROPOSALS will be received by the Morris Canal and Banking Company, at the Engineers Office, Meades Basin, from the 1st to the 4th of August next, for the excavation, embankment, and mechanical work on the Long Pond Feeder, a distance of five and a half miles. Also, for the erection of a stone mda, and other work, near the outlet of Long Pond. Plans and Specifications of the work may be seen at the Engineers office, after the 1st of August.

R. B. MASON, Engineer.

29—tlaug.

HARTFORD AND NEW HAVEN RAILROAD.

The H. and N. H. Railroad Company, are prepared to make immediate contracts for 200,000 running feet of Southern yellow pine, to measure six inches square and from eighteen to thirty feet in length; of the quality best suited to receive a flat iron rail,—the above to be delivered at New Haven by the first day of May next. Also for 200,000 running feet in addition, to be delivered by the first day of September 1837, at Hartford or Middletown.

PROPOSALS may be addressed to

ALEX. C. TWINING, Engineer.

New Haven, July 19th, 1836. 29—3t.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal

The work will be prepared for examination by the 25th July, but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River
and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

JAMES G. KING, President.
21—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Fsq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillison,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.
Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. ☞(1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap	Shovels	
150 do	do	do plain	do
150 do	do	do cast steel	Shovels & Spades
150 do	do	Gold-mining	Shovels
100 do	do	plated	Spades
50 do	do	socket	Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

MILL-DAM FOUNDRY.

TO BE SOLD OR LEASED the above well known establishment, situated one mile from Boston. The improvements consist of,

No. 1. *Boiler House*, 50 feet by 30 feet, containing all the necessary machinery for making boilers for *Locomotive* and other steam Engines.

No. 2. *Blacksmith's Shop*, 50 feet by 20, fitted with cranes for heavy work.

No. 3. *Locomtive House*, 54 feet by 25, used for putting together Locomotive Engines. Several of the best Engines in use in the United States have been put in this establishment.

No. 4. A three story brick building, covered with slate, 120 feet by 46, containing two water-wheels, equal to 40 horse power; Machine Shop, filled with lathes, &c.; Pattern Shop; Rolling Mill and Furnaces, capable of rolling 4 tons of iron per diem, exclusive of other work; three Trip Hammers, one of which is very large; engine for blowing Cupola Furnaces, moved by water-wheel; one very superior 12 horse Steam Engine, which could be dispensed with; and a variety of other machinery.

No. 5. An Iron Foundry, 80 feet by 45, with a superior air Furnace, and two Cupolas, Core oven, Cranes, &c. fitted for the largest work. Attached to the Foundry is a large ware-house, containing Patterns for the Castings of Hydraulic Presses, Locomotive and other Steam Engines, Lead Mill Rolls, Geering, Shafts, Stoves, Grates, &c. These were made of the most durable materials, under the direction of a very scientific and practical Engineer, and are supposed to be of great value.

No. 6. A building, 65 feet by 36, containing a large stack of chimneys, and furnaces, for making Cast Steel. This building has been used as a boarding-house, and can accommodate a large number of men.

No, 7. A range of buildings, 200 feet long by 30, containing counting room, several store rooms, a Brass Foundry, room for cleaning castings, a large loft for storing patterns, stable for two horses, &c. &c.

The above establishment being on tide water, presents greater advantages for some kinds of business than any other in the United States. Coal and Iron can be carried from vessels in the harbors of Boston, to the wharf in front of the Factory, at 25 to 30 cents per ton. Some of the largest jobs of iron work have been completed at this establishment; among others, the great chain and lift pumps for freeing the Dry Dock at the Navy Yard, Charleston.

The situation for Railroad work is excellent, being in the angle formed by the crossing of the Providence and Worcester Railroads. The Locomotive "Yankee," now running on the latter road, and the "Boston," purchased by the State of Pennsylvania, were built at these works. With the Patterns and Machinery now in the premises, 20 Locomotives, and as many tenders, besides a great quantity of cars and wagons, could be made per annum.

For terms, apply to
THOS. J. ECKLEY, Boston,
or to ROBERT RALSTON, Jr. Phila.
Boston, April 21, 1835. j25—4t

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del